

**DISSERTATION ON**  
**ACCURACY OF CLINICAL DIAGNOSIS IN**  
**ACUTE APPENDICITIS**

**M.S. DEGREE EXAMINATION**  
**BRANCH-I**  
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## **CERTIFICATE**

This is to certify that this dissertation entitled “**ACCURACY OF CLINICAL DIAGNOSIS IN ACUTE APPENDICITIS**” is the bonafide record work done by **DR. C. SRIDHAR** submitted as partial fulfillment for the requirements of **M.S. Degree Examinations Branch I, General Surgery, MARCH 2007.**

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## CONTENTS

Sl. No.	Title	Page No.
1.	INTRODUCTION	1
2.	AIM OF THE STUDY	3
3.	HISTORY	4
4.	REVIEW OF THE LITERATURE	6
5.	MATERIALS AND METHOD	41
6.	OBSERVATION	43
7.	DISCUSSION	45
8.	SUMMARY	48
9.	CONCLUSION	51
10.	PROFORMA	52
11.	BIBLIOGRAPHY	56
12.	MASTER CHART	57

## **INTRODUCTION**

Acute Appendicitis with 7 % lifetime risk, remains the most common indication for emergency abdominal Surgery. Considerable morbidity continue to be associated with appendicitis despite what is currently considered to be appropriate antibiotic and surgical care. Although the overall mortality rate is less than 1 % in many series, the mortality associated with appendicitis in elderly and infants ranges between 5 % and 15 %. The incidence of perforation commonly ranges from 17 % to 40 % is increased at both spectrums of age and is well known to be associated with significant morbidity.

Surgical doctrine suggests that a percentage of negative laparotomies are necessary and acceptable to limit the rate of perforation as the diagnosis of acute appendicitis is essentially clinical. Current studies demonstrate the negative laparotomy rate to range from 15% to 30% and to be associated with significant morbidity. Because lower abdominal pain may be due to pelvic inflammatory disease or other obstetrical or gynecological etiologies, the normal appendix at exploration are high in reproductive age group women.

The purpose of this study is to know the accuracy of clinical diagnosis in appendicitis by correlating histopathological examination report of removed appendix specimen against clinical diagnosis in Thanjavur Medical College Hospital over a period of two years between August 2004 to July 2006 and discuss it in the light of available literature.

## **AIM OF THE STUDY**

The objectives of this clinical study are

1. To know the accuracy of clinical diagnosis in appendicitis by comparing with histopathological examination report of removed appendix specimen.
2. To compare the negative laparotomies in this study against the other studies.

## HISTORY

Acute appendicitis is a common acute Abdominal emergency Condition requiring surgery.

1736 Claudius Amyand	-	Performed first appendicectomy in right scrotal hernia accompanied by a fistula.
1753 Heister	-	described appearances of the gangrenous and perforated appendix.
1827 Melier	-	suggested the antemortem recognition of appendicitis.
1848 – Hancock	-	Drained the appendicular abscess.
Reginald Fist	-	Coined the term appendicitis.



- |             |  |
|-------------|--|
| Parker      | - Described the three stages of Appendicitis—gangrene, perforation, abscess.     |
| 1887 Morton | - First successfully removed the Appendix with intention of curing appendicitis. |

## **REVIEW OF LITERATURE**

### **ANATOMY:**

Vermiform appendix is a blind muscular tube with mucosal, submucosal, muscular and serosal layers. The appendix first becomes visible in the eighth week of embryological development as a protruberance of the terminal portion of caecum. During both antenatal & postnatal development the growth rate of caecum exceeds that of appendix displacing the appendix medially towards the ileocecal valve.

The relationship of the base of appendix to cecum remains constant whereas the tip can be found in : retrocaecal – 74 %

Pelvic - 21 %

Paracaecal - 2 %

Subcaecal - 1.5 %

Preileal - 1 %

Postileal - 0.5 %

The tinea coli converge at the junction of caecum with appendix and can be a useful landmark to identify the appendix. The appendix varies in length from less than 1cm to greater than 30cm and most appendices are 6 to 9 cm in length. Appendiceal absence, duplication and diverticula have all been described.

Mesentery of appendix or mesoappendix arises from lower surface of mesentery of terminal ileum and is subject to great variation.

The appendicular artery, a branch of lower division of ileocolic artery passes behind the terminal ileum to enter the mesoappendix and the free border of mesoappendix. Accessory appendicular artery may be present. In most people the appendicular artery is an end artery, its thrombosis results in necrosis of appendix.

Four to six or more lymphatic channels traverse the mesoappendix to empty into the ileocaecal lymph nodes.

**Microscopy:** The lumen is irregular, lined by columnar cells  
Intestinal mucosa of colonic type. Crypts are  
present. Argentaffin cells are present in base of  
the crypts.  
The submucosa contains lymphatic aggregation  
(or) follicles.

### **FUNCTION:**

It is now well recognized that the appendix is an immunological organ that actively participates in the secretion of immunoglobulins particularly IgA.

Although appendix is an integral component of gut associated lymphoid tissue (GALT) system. Its function is not essential and appendectomy is not associated with any predisposition to sepsis or any other manifestation of immune compromise.

**INCIDENCE:**

Acute appendicitis is relatively rare in infants and becomes increasingly common in childhood and early adult life, reaching peak incidence in the teens and early 20s. After the middle age the risk of developing appendicitis in the future is quite small.

The incidence of appendicitis is equal among males and females before puberty. In teenagers and young adults the male-female ratio increases to 3:2 at age 25 and thereafter the greater incidence in males declines.

**ETIOLOGY**

There is no unifying hypothesis regarding the etiology of acute appendicitis. The most commonly accepted theory is obstruction of appendicular lumen by

- Hyperplasia of submucosal lymphoid follicles.
- Fecolith
- Fibrotic Stricture
- Tumor – appendix, cecum
- Worms (pinworm-oxyuris vermicularis)

Once the lumen of appendix is obstructed the sequence of events occurs as follows:

- Mucus accumulates within the lumen and pressure within the organ increase. Bacteria convert the accumulated mucus into pus, which cause further increase in pressure and obstruction of lymphatic drainage leading to edema diapedesis of bacteria and appearance of mucosal ulcers.
- Continued secretion and increasing edema cause venous edema, end in ischemia of appendix.
- As this pathological process continues venous and arterial thrombosis occur in the wall of appendix, resulting in gangrenous appendicitis. At this stage small multiple infarcts occur which results in perforation permitting escape of bacteria and contamination of peritoneal cavity.

Typically two clinical syndromes of acute appendicitis can be designed – acute catarrhal (non obstructive)

acute obstructive.

**CLINICAL DIAGNOSIS:****History:**

Pain: The typical pain initially diffuse, central, minimally severe visceral pain, followed by somatic pain that is more severe and well localized to right lower quadrant. This classical visceral to somatic sequence is present in up to 55% of cases.

Atypical pain may be somatic and localized to right lower quadrant from its initiation, common in old age.

The pain may remain diffuse and never become localized in few cases.

High retrocaecal appendicitis may present with only diffuse pain in the right flank.

When the entire appendix is within true pelvis, there may be no pain and instead may cause tenesmus and vague discomfort in the suprapubic area.

**Anorexia, Nausea, Vomiting:**

- Anorexia and nausea are present in almost all patients with acute appendicitis.
- Vomiting occurs in fewer than 50% of patients and when occurs it is usually once or twice, not persistent. Vomiting occurs after the onset of pain and if occurs before pain the diagnosis of appendicitis should be questioned.

**Constipation and Diarrhea:**

- Greater percentage of patients with appendicitis complain of constipation. Out some give history that defecation relieves the pain.



## **PHYSICAL EXAMINATION:**

The diagnosis of appendicitis rests more on thorough clinical history and examination of the abdomen than on laboratory investigation.

The cardinal features are unwell patient with low grade pyrexia, localized abdominal tenderness, muscle guarding and rebound tenderness.

### **Tenderness, Muscle guarding:**

- Area of maximum tenderness will be elicited in McBurney's point, which is located in right spinoumbilical line at the junction between medial 2/3<sup>rd</sup> and lateral 1/3<sup>rd</sup>.
- Cough tenderness may be present in 85% of patients.
- Rovsing's sign-palpation pressure in left lower quadrant elicits pain in RLQ ( Right Lower Quadrant)
- Muscle guarding manifest as resistance to palpation, increases in severity as involvement of parietal peritoneum increases, initially it is only voluntary but is replaced by reflex involuntary rigidity.

**Abdominal Mass:**

- As the disease progresses there may be palpable tender mass in right lower quadrant.
- This may be due to abscess or adherence of omentum and loops of intestine to an inflamed appendix.
- If appendix ruptures and infection is contained appendicular mass develop in right lower quadrant and area of tenderness will present in the entire right lower quadrant with guarding, rebound tenderness, rise of temperature and tachycardia.
- If appendiceal rupture fails to localize, signs & symptoms of diffuse peritonitis will develop.

**Rectal Examination:**

- In uncomplicated appendicitis the finger cannot reach high enough to elicit pain on rectal examination.
- Pelvic abscess can be detected by rectal examination.

## **SPECIAL FEATURES, ACCORDING TO POSITION OF THE APPENDIX:**

- Retrocaecal - Rigidity is often absent
- Deep palpation may fail to elicit Tenderness
  - Psoas spasm due to inflamed appendix in contact with the muscle may cause flexion of hip.

### **Pelvic**

- Early diarrhea due to contact with rectum
- When it lies completely within the true pelvis no pain, tenderness, rigidity at McBurney's point.
- Rectal examination may reveal tenderness in rectovesical pouch or pouch of Douglas.
- When inflamed appendix is in contact with Bladder, may cause frequency of micturition.

### **Post-Ileal**

- Presents great difficulty in diagnosis
- The pain may not shift, diarrhea is a feature, marked retching may occur.
- Cause illdefined tenderness immediately right of umbilicus.

**SPECIAL FEATURES ACCORDING TO AGE:****INFANTS:**

- Appendicitis is relatively rare in infants under 36 months of age.
- Diagnosis is often delayed & incidence of perforation and postoperative morbidity is high.

**CHILDREN**

- Usually associated with vomiting and have aversion to food, in addition do not sleep during attack, very often bowel sounds are completely absent in early stages.

**ELDERLY**

- Gangrene and perforation occur much more frequently
- As the abdominal wall is lax or obese the signs and symptoms are masked or very minimal.
- Coexisting medical condition, late presentation cause more morbidity & mortality.

## **PREGNANCY:**

- Appendicitis is the most common extrauterine acute abdominal condition in pregnancy with the frequency of 1 in 1500 to 2000 pregnancies.
- Diagnosis complicated by delay in presentation due to early nonspecific symptoms, which are often attributed to pregnancy and Progressive displacement of caecum and appendix as pregnancy advances.
- Fetal loss occurs in 3.5% of cases and increase to 20% if perforation is found at operation.

## **DIFFERENTIAL DIAGNOSIS:**

There are number of common conditions that is wise to consider carefully and if possible exclude. The differential diagnosis differs in patients of different ages.

### **Children:**

Acute Gastroenteritis:

Intestinal colic together with diarrhea and vomiting but no localized tenderness. Other family members being affected.

### Mesenteric lymphadenitis:

- Intermittent colicky abdominal pain.
- Cervical lymphnodes may be enlarged.
- Shifting tenderness when the child turns on his / her left is strong evidence.

### Meckel's diverticulitis:

Pain is similar, signs may be central or left sided, it is difficult to distinguish.

### Intussusception:

Appendicitis is uncommon before the age of 2, where as median age for intussusception is 18 months. A mass may be palpable on right lower quadrant.

### Henoch schonlein purpura:

- Abdominal pain is severe and confused with appendicitis or intussusception
- There is nearly always an ecchymotic rash in the extensor surface of limbs and buttocks.

Lobar pneumonia, pleurisy:

- May give rise to right side abdominal pain and mimic appendicitis. Abdominal tenderness is minimal, pyrexia is marked and chest examination may reveal pleural friction rub (or) altered breath sounds.
- Chest X-ray is diagnostic.

### **Adults:**

Terminal Ileitis: an antecedent history of abdominal pain, weight loss and diarrhea suggests regional enteritis rather than appendicitis. Ileitis may be nonspecific, due to crohn's disease (or) yersinia infection.

Ureteric colic: The character and radiation of pain differs from appendicitis. Urine analysis should always be performed and presence of RBC should prompt a supine abdominal radiograph. Renal USG or IVP is diagnostic.

Right sided acute pyelonephritis :

Pain is accompanied and often by increased frequency of micturition. It may cause difficulty in diagnosis in women.

### Perforated Peptic ulcer:

Duodenal contents pass along the paracolic gutter to right iliac fossa and produce pain, tenderness, rigidity in right iliac fossa. An abdominal CT is valuable when there is diagnostic difficulty.

### Testicular Torsion:

Pain can be referred to right iliac fossa and shyness on the part of the patient may lead the unwary to suspect appendicitis unless scrotum is examined in all cases.

### Acute Pancreatitis:

Should be considered in differential diagnosis of all adult patients suspected of acute appendicitis and when appropriate excluded by serum or urinary amylase measurement.

### Rectus Sheath hematoma:

- Is a rare but easily missed diagnosis.
- Localized pain with out gastrointestinal upset is the rule.

### **Adult female:**

A careful gynecological history should be taken in all woman with suspected appendicitis concentrating on menstrual cycle, vaginal discharge and possible pregnancy.



#### Pelvic Inflammatory disease:

- Spectrum of disease include salpingitis, endometritis, and tubo ovarian sepsis.
- Typically pain is lower than appendicitis and burning pain, dysmenorrhoea vaginal discharge usually present.
- Adnexal and cervical tenderness on vaginal examination.
- Transvaginal USG may be helpful. When uncertainty persist, diagnostic laparoscopy should be under taken.

#### Mittelschmerz:

- Midcycle rupture of follicular cyst with bleeding produce lower abdominal pain, systemic upset is rare. Pregnancy test is negative and symptoms usually subside within hours.

#### Torsion/Hemorrhage of an ovarian cyst:

- When suspected, pelvic USG and gynecological opinion should be sought.
- If encountered at operation, untwisting of the involved adnexa and ovarian cystectomy should be performed, if necessary in women of child – bearing years.

Ectopic pregnancy:

- Severe pain is felt when cervix is moved on vaginal examination. Sign of intraperitoneal bleeding usually apparent. Pelvic USG should be performed in all cases in which an ectopic pregnancy is a possible diagnosis.

### **Elderly:**

Sigmoid diverticulitis:

- In some patients with a long sigmoid loop the colon lies to the right of the midline and it may be impossible to differentiate between diverticulitis and appendicitis.

Intestinal obstruction:

- The diagnosis is usually clear, the subtlety lies in recognizing acute appendicitis as occasional cause in elderly.

Carcinoma of the caecum:

- When obstructed (or) locally perforated carcinoma of caecum may mimic or cause obstructive appendicitis in adults.

### **RARE DIFFERENTIAL DIAGNOSIS:**

- Preherpetic pain of the right 10 & 11<sup>th</sup> Dorsal nerves
- Tabetic crises.
- Spinal conditions; TB Spine, Metastatic deposits, osteoporotic collapse, multiple myeloma.
- Porphyria and diabetes mellitus.
- Typhilitic or leukaemic ileocaecal syndrome; is rare but fatal enterocolitis occurring in immunosuppressed patients.

### **INVESTIGATIONS:**

The diagnosis of acute appendicitis is essentially clinical however a decision to operate based on clinical suspicion alone can lead to removal of a normal appendix in 15 to 30% of cases. There is no laboratory (or) radiological test yet devised that is 100% diagnostic of this condition.

### **White blood cell count:**

- The leucocyte count is raised above 12000 in about 75% of the patients with appendicitis.
- Neutrophilia may be present.
- One must not discount the diagnosis under these circumstances.

**C-reactive protein:**

- It has been introduced as potential marker. CRP in combination with total count and differential count may help in improving the diagnostic accuracy.

**Urine examination:**

- Should be done routine in every patient with acute abdominal pain.
- Hematuria, pus cells in urine points to UTI but by no means excludes acute appendicitis.

**Radio graphy:**

Plain x ray films of the abdomen with the patient in the erect and supine position are of value in differential diagnosis of acute abdominal pain, but radiological features are nonspecific and must be interpreted with caution.

- Fluid levels localized to caecum and to the terminal ileum.
- Localized ileus with gas in caecum, ascending colon and terminal ileum.
- Increased soft tissue density in right lower quadrant
- Blurring of right flank Preperitoneal fat strip.

- Fecolith in right iliac fossa
- Blurring of psoas shadow on right side.
- Gas filled appendix
- Free intraperitoneal gas.
- Deformity of cecal gas shadow owing to an adjacent inflammatory mass.

#### Barium Enema:

- Persistent nonvisualization of appendix.
- Partial visualization of appendix.
- Pressure effect on the cecum.
- Irritability of the cecum and terminal ileum on scarring.

#### Ultrasonography:

May be helpful in differentiation of gynecological, urological causes of acute abdominal pain, with improved techniques, the acutely inflamed appendix itself can be visualized. The USG appearances of acute appendicitis are

- Noncompressible aperistaltic tubular structure
- Central dilated lumen

- Inner echogenic mucosal layer and an outer edematous wall that shows few echoes.
- Presence of appendicolith
- Complex mass.

**CTscan: (contrast enhanced)**

- Is more accurate than USG
- Diagnostic features; thickened appendix with a diameter >6mm. Phlegmon, fluid, Abscess, presence of appendicolith, inflammatory changes in periappendiceal fat.
- It is not indicated in patients with an unequivocal diagnosis of appendicitis or in patients with a low risk of the diagnosis.

**Radionuclide Imaging:**

- Radio labelled autologous leukocytes have been developed that have a high sensitivity and specificity in the diagnosis of appendicitis.
- <sup>99m</sup>Tc-labelled intact polyvalent human immune globulin and <sup>99m</sup>Tc labelled anti-granulocyte antibody Fab fragments also having high sensitivity and specificity.

## **TREATMENT**

The treatment of acute appendicitis is appendicectomy.

### **Preoperative preparation:**

All patients especially those with a presumed diagnosis of peritonitis should be adequately prepared before being taken to the operating room.

Intravenous fluid replacement and resuscitation as rapidly as possible as should be made especially when peritonitis is suspected.

Nasogastric suction if peritonitis and profound ileus are present and temperature  $> 39^{\circ}\text{C}$ .

Broad spectrum antibiotic to cover gram-negative, anaerobic organism preoperatively to control and reduce incidence of wound sepsis. Antibiotics should be continued in case of gangrenous and ruptured appendix, while single dose is sufficient for early appendicitis.

### **Examination under Anaesthesia**

All patients abdomen should be examined after induction of appropriate anaesthesia, such examination may reveal other diagnosis, and appendicular mass.

### **Uncomplicated appendicitis without palpable mass**

In these circumstances appendicectomy should be performed. Earlier the diagnosis made, sooner the appendicectomy is performed, better the prognosis.

The recommended incisions are

- Grid-iron incision
- Transverse skin crease Lanz incision
- Rutherford Morison's if appendix is Para / retrocecal and fixed

### **Methods to be adopted in special circumstances :**

- When the base of appendix is inflamed, it should not be crushed but ligated close to cecal wall just tightly enough to occlude the lumen, after which appendix is amputated and stump invaginated.
- When the base is gangrenous neither crushing nor ligation must be attempted, two stitches are placed through the caecal wall close to the base of gangrenous appendix which is amputated flush with cecal wall, after that these stitches are tied.



- Retrograde appendicectomy; when the appendix is retrocaecal and adherent, it is an advantage to divide the base first and proceed distally. Occasionally this manoeuvre requires division of lateral peritoneal attachments of caecum.
- Drainage of peritoneal cavity: Usually unnecessary, may be needed when considerable purulent fluid in retrocaecal space or pelvis is present.

### **Laparoscopic appendicectomy**

Most valuable aspect of laparoscopy is as diagnostic tool and if required to be used as therapeutic tool.

Open technique should be used to establish pneumoperitoneum with empty bladder in moderate Trendelenburg tilt of operating table.

The appendix is found and appendicectomy done as in conventional method.

Patients who undergo laparoscopic appendicectomy have less postoperative pain, early discharge and less wound infection. The incidence of postoperative intrabdominal sepsis may be higher in patients operated on for gangrenous or perforated appendicitis when compared to open method.

**Problems encountered during appendicectomy**

If a normal appendix is found; demands careful exclusion of other possible diagnosis – terminal ileitis, Meckel's diverticulitis, tubal or ovarian causes. It is usual to remove the appendix to avoid future diagnosis difficulties.

The appendix cannot be found; Caecum should be mobilized and the taeniae coli should be traced to their confluence on the caecum before diagnosis of absent appendix is made.

An appendicular tumor is found; small tumors (less than 2cm in diameter) can be removed by appendicectomy. Larger tumors should be treated by right hemicolectomy.

An appendix abscess is found and appendix cannot be removed; should be treated by local peritoneal toilet, drainage of any abscess and IV – antibiotics. Very rarely a caecectomy or partial right hemicolectomy is required.

### **Appendicitis complicating Crohn's disease:**

- If cecal wall is healthy at the base of appendix  
appendicectomy can be performed.
- Appendix is rarely involved in crohn's disease in this situation  
Conservative approach may be warranted.

### **Appendix abscess:**

- CT or USG guided percutaneous drain, if it fails,  
laparotomy through midline is indicated

### **Pelvic abscess**

- Is an occasional complication of appendicitis, can occur  
irrespective of position of the appendix, it cause spiking  
pyrexia, pelvic pressure, discomfort, tenesmus.
- Rectal examination reveals a boggy mass in pelvis.  
Pelvic USG, or CT scan will confirm the diagnosis
- Treatment is transrectal drainage under GA

## **Management of an appendix mass**

If an appendix mass is present and the condition of the patient is satisfactory the standard treatment is conservative OCHSNER- SHERREN regimen by careful record of the patient's general condition, extent of mass, its periodic examination, intravenous fluids and antibiotics.

Clinical deterioration or evidence of peritonitis are indication for early laparotomy. If an abscess is present, it should be drained under radiological control or open method.

## **Postoperative complications**

These are relatively uncommon and reflect the degree of peritonitis which was present at the time of operation and intercurrent disease that may predispose to complications.

wound infection : Most common complication, occur in 5 to 10% of all patients.

Intrabdominal abscess : Relatively rare after use of preop antibiotics.

Fever, malaise, Anorexia after 5-7 days of surgery suggest an intraperitoneal collection, Interloop, paracolic, pelvic and subphrenic sites should be considered.

Abdominal USG/CT- confirm diagnosis

Treated by Percutaneous drainage or laparotomy.

### Ileus

Persistent ileus may be indicative of intra abdominal abscess.

### Respiratory

:

Rare, adequate postoperative analgesia and physiotherapy reduce the incidence.

### Venous thrombosis and embolism:

#### Portal pyaemia

:

- Rare, but serious complication of gangrenous appendicitis associated with high fever, rigors and jaundice .
- It is caused by septicemia in portal venous system and leads to development of intrahepatic abscess.

Fecal fistula - Occurs rarely

Occasionally a fistula may result following appendicectomy in crohn's disease.

Adhesive intestinal obstruction

Right inguinal hernia : Due to injury to iliohypogastric nerve.

**Chronic and recurrent appendicitis:**

- One or more attacks of acute appendicitis.
- Between the attacks patients are free of symptoms and physical examination is normal
- If fecolith is present an X ray, no filling of the appendix on barium enema.
- On repeated examination during an attack shows evidence of recurrent Appendicitis. Elective appendicectomy should be undertaken.

### **Pathological examination of appendix:**

Early acute appendicitis:

- Subserosal vessel congestion,
- Moderate peri vascular Neutrophilic infiltrate.
- Normal glistening serosa into dull granular red membrane.

Acute suppurative appendicitis.

- Prominent neutrophilic exudates generates a fibrinopurulent reaction over the serosa.
- Abscess formation within the wall of appendix Necrosis ulceration in the mucosa.

Acute gangrenous appendicitis :

- Large areas of hemorrhagic green ulceration of mucosa and green black gangrenous necrosis through the wall extending to serosa.

Chronic appendicitis:

- Fibrosis in appendiceal wall. Partial to complete Obstruction of the lumen.
- Evidence of old mucosal Ulceration, scarring and infiltration of wall with Chronic inflammatory cells.

### **Operative Techniques**

Appendectomy can be done by two methods :

- OPEN SURGICAL METHOD
- LAPAROSCOPIC APPENDICETOMY

Open surgical method is still the comoner method used and can be done through various incisions.

GRIDIRON INCISION is the most commonly used and remains the incision of choice in a patient where the diagnosis of appendicitis is certain. The incision is made at right angles to the spinoumbilical line centered over the Mc Burney's point. The incision is progressively deepened and one encounters the branches of the superficial circumflex iliac astery which needs to be ligated. The external oblique is seen and is incised in the line of the incision. Following this the internal oblique and the transverses



abdominis muscle are seen which are separated and retracted. Thereafter, the peritoneum is incised to enter the abdominal cavity. Grid-iron is a popular incision associated with the lowest incidence of complications.

LANZ INCISION is similar to the grid-iron incision except that it is transverse rather than oblique. Lanz incision is made 2cm below the umbilicus, centered on the midclavicular – midinguinal line. It gives a better cosmetic result and is being increasingly used. The incision can be extended medially and when necessary the rectus abdominus muscle can be divided in the line of the incision.

RUTHERFORD MORISON'S INCISION is an oblique muscle cutting incision with its lower end centered over the Mc Burney's point. One resorts to this incision when there is an inadequate access with a Grid-iron incision.

PARAMEDIAN INCISION is preferred when the diagnosis is in doubt. It is a vertical incision given 1.25 to 2.5 cm to the right of the midline which commences 2.5 cm below the umbilicus and extends till just above the pubis. It provides good access to the pelvic organs in females and can easily be extended upwards. The disadvantages of this incision is the

poorer access to the right iliac fossa and real possibility of causing peritoneal contamination in an otherwise localized infection

### **Technique**

- When the abdomen is opened, any free fluid should be taken for culture and sensitivity. The rest of the pus and free fluid is sucked away .
- The caecum is identified and held in a moist pack, gradually withdrawn towards its lower ends and medially . This normally delivers appendix into the wound.
- In case of difficulty in identifying appendix then one should trace the taeniacoli on the cecum which leads to appendix. In case of difficulty there should be no hesitation in extending the incision or conversion to a muscle cutting incision.
- Once the appendix is clearly visualized it is raise up and held by a Babcock's tissue holding forceps. The meso appendix is then clamped, divided and ligated.

- Thereafter the appendix is crushed by a forceps applied to the base which is moved distally to be reapplied and left in place. A catgut ligature is tied around the crushed portion close to the caecum. An atraumatic catgut pursestring or a Z suture is inserted into the caecal wall near the base of the appendix.
- Abdominal mops are placed all round the appendix which is divided by a knife distal to the forceps. The appendiceal stump is then invaginated into the caecum while the purse-string suture is tied. However, this may be impossible if the adjacent caecal wall is edematous and friable. Some surgeons omit the step of invagination.
- Hemostasis is secured and peritoneal lavage with saline should be done, especially so in presence of pus.
- Drainage is usually not necessary though in gross contamination soft drain may be kept for 48 hours

- The wound is closed in layers. Some recommend if there is a gross contamination, skin wound should be left open and closed after few days under local anaesthetic.

## LAPAROSCOPIC APPENDICECTOMY

- Is another possible method of performing this operation.
- Patients return slightly earlier to work than those who have undergone open method.
- It involves learning curve, greater operating time and higher cost.

## **MATERIALS AND METHODS**

### **Materials**

This work includes the study of 100 patients with clinical diagnosis of acute appendicitis admitted in Thanjavur Medical College Hospital between Aug.2004 to July 2006.

All of them were admitted as emergency.

### **Methods:**

This include detailed history from the patients, clinical examination, blood studies (total count, differential count), plain X- ray abdomen and urine examination.

All the information were entered in the proforma specially designed for this study.

### **Management**

All the cases were informed that surgery is the definite treatment. The nature of surgery and its complication were explained and informed consent was obtained.

All patients were operated under regional or general Anaesthesia

All patients were given preoperative and Post operative antibiotics.

Appendicectomy done by open conventional method, through Lanz transverseskin crease incision, right paramedian incision depending on the preoperative findings.

During surgery the macroscopic pathological anatomy of the appendix noted. if the appendix was found to be normal, the other etiologies were identified and treated in appropriate manner. In this situation, even though the appendix was normal, appendicectomy done to avoid future confusion in diagnosis.

All the appendicectomy specimen were sent for histopathological examination in the Department of Pathology TMCH Thanjavur for clinicopathological correlation.

After surgery the patients were discharged on 3-7days except in cases of complications.

## **OBSERVATION**

In our study the following observation were made

### **1. Age incidence**

10-20Yr: 35 patients

21-30Yr: 34 patients

31-40Yr: 18 patients

41-50Yr: 8 patients

51-60Yr: 5 patients

### **2. Sex incidence**

56 : Male

44 : Female

### **3. Clinical Features**

Mild to moderate pyrexia in 38 patients.

Localized tenderness in all 100patients

Guarding & rigidity in 17 patients

Rebound tenderness in 61 patients

**4. Peroperative change of diagnosis : 5**

Ovarian cyst torsion: 2

Ileocaecal Tuberculosis - 1

Intussusception (Ileocolic)- 1

Caecal abscess with vanishing appendix - 1

**5. Histopathological report**

Inflamed - 89

Normal - 11

**Wound infection:** 22 cases

**6. Enterocutaneous fistula:** 1case

**Mortality :** One Patient died of septicemia due to necrotizing fasciitis following wound infection.

**Total Count** was more than 11.000 in 26 patients, of these one had normal appendix, remaining with inflamed appendix on histopathological examination.



## DISCUSSION

It is known from various current studies and textbooks removal of normal appendix rate to range from 15 % to 35%.

Piper and associates conducted a careful study to know the accuracy of diagnosis in acute appendicitis, they reviewed 1018 appendicectomies, carried out in stockholm, in patients whose age ranged from 1 to 89 years,

- The diagnosis was correct in 67% of the cases.
- In Male the accuracy was 77.7 %
- In Female the accuracy was 58 %
- In the Reproductive female patients aged between 10 to 39 the diagnostic accuracy was 52.7 % due to high incidence of co existing gynecological disorders. (which were accounted in 15.5 % of cases) .

In Another study, fate of negative appendix conducted by Fredric C.Chang et all in 183 patinets. The clinical diagnostic accuracy for appendicitis was 67% as overall. There was a statistically significant difference in accuracy of diagnosis according to sex, in male the accuracy was 79%, in female 54 %.

In our study of 100 patients from histopathological examination of appendix and other diagnosis during surgery, the clinical diagnostic accuracy overall was 89%, in male 92.85 % (52 out of 56) in female 84.10 % (37 out of 44 patients), in the active reproductive age group the negative rate was 17.64%.

It is known from the study that detailed clinical history and examination can reduce the rate of removal of normal appendix.

The diagnostic accuracy can still more improved by appropriate use of USG, CT adomen in equivocal cases, for exclusion of other disease and diagnosis of appendicitis.

In our study only 25 out of 89 acute appendicitis patients had elevated total count, this accounts for 28.1 %. In piper et al study 66.7 % of acute appendicitis patients had leukocyte count of 11,000 or more, and

Chang et al study it was 85 %. From this observation it is known that leukocyte count may be normal in acute appendicitis patients.

**Limitations of this study**

- 1      Less number of patients.
- 2      No patients were included in the aged group less than 10 years.  
         and more than 60 years.
- 3      Less number of female patients.
- 4      Possibilities of bias.

## **SUMMARY**

The observation made in this study are .

1. 100 cases were admitted with the diagnosis of acute appendicitis. Age of the patients ranged from 11 to 60 years.
2. 56 were males and 44 were females.
3. All patients were resuscitated and given pre and post operative antibiotics.
4. All patients were treated by surgery with appendicectomy and appropriate surgical treatment for other diseases, which were diagnosed during surgery.
5. All the removed appendix specimen were studied by macroscopic and microscopic examination.

6. 5 of 100 patients had different diagnosis other than appendicitis during surgery – 2 ovarian cyst torsion
  - 1 Ileocaecal tuberculosis
  - 1 Intussusception
  - 1 Caecal abscess
7. 11 of 100 removed appendix specimen were normal on histopathological examination report.
8. The overall and sex specific diagnostic accuracy was calculated by clinicopathological correlation.
9. The overall diagnostic accuracy was 89%, the diagnostic accuracy in male 92.85% (52 out of 56), in female 84.10% (33 out of 44).
10. In the active reproductive age group (10 to 39 years) the accuracy of clinical diagnosis was 82.34% (28 out of 34).

11. When compared to piper and associates study and Fredic C. Chang et all study, Clinicial diagnostic accuracy in our study was high in male, female and female reproductive age group patients.
12. 25 out of 89 patients with acute appendicitis has elevated total WBC count more than 11,000 per cubic millimeter (28.1 %) and it is low when compared to piper et al study (66.7 %) and Chang et al (85%).

## CONCLUSION

1. Appendicitis is common in 2 to 3<sup>rd</sup> decade of life.
2. Acute appendicitis is essentially clinical diagnosis.
3. Detailed clinical history and examination can reduce the removal of normal appendix.
4. The clinical diagnostic accuracy is better in male sex than in female.
5. In female the clinical diagnostic accuracy is low especially in active reproductive age group patients.
6. By appropriate use of Ultrasound and CT Abdomen removal of normal appendix in equivocal cases can be reduced further.
7. Total white blood cell count may be normal in acute appendicitis.

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**PROFORMA**

Acute appendicitis

**HISTORY**

Name

Age                      DOA

Sex                      DOS

Ip No                    DOD

Address

Occupation

Wd.                      UNIT

**COMPLAINTS:**

Abdominal pain

Nausea

Vomiting

Fever

Anorexia

Diarrhea

Constipation

Past History:

Hypertension, TB, DM

Previous surgery

Previous Similar episode

Personal History:

Smoking / Alcoholism / Betel nut chewer

Menstrual History in Female

General Examination:

Built & nourishment

Anemia Temperature

Vital signs

Cardio vascular system

Respiratory system

Abdomen:

Distension

Localized Tenderness, Rebound Tenderness

Guarding and rigidity

Bowel sounds.

External genitalia

Per rectal Examination

Investigation

URINE – Albumin

Sugar

Deposits

Hb%, Total count,

Blood Urea,

Blood Sugar,

Sr Creatinine,

ECG, X Ray Chest,

Plain X ray Abdomen,

Anaesthesia,

Surgery,

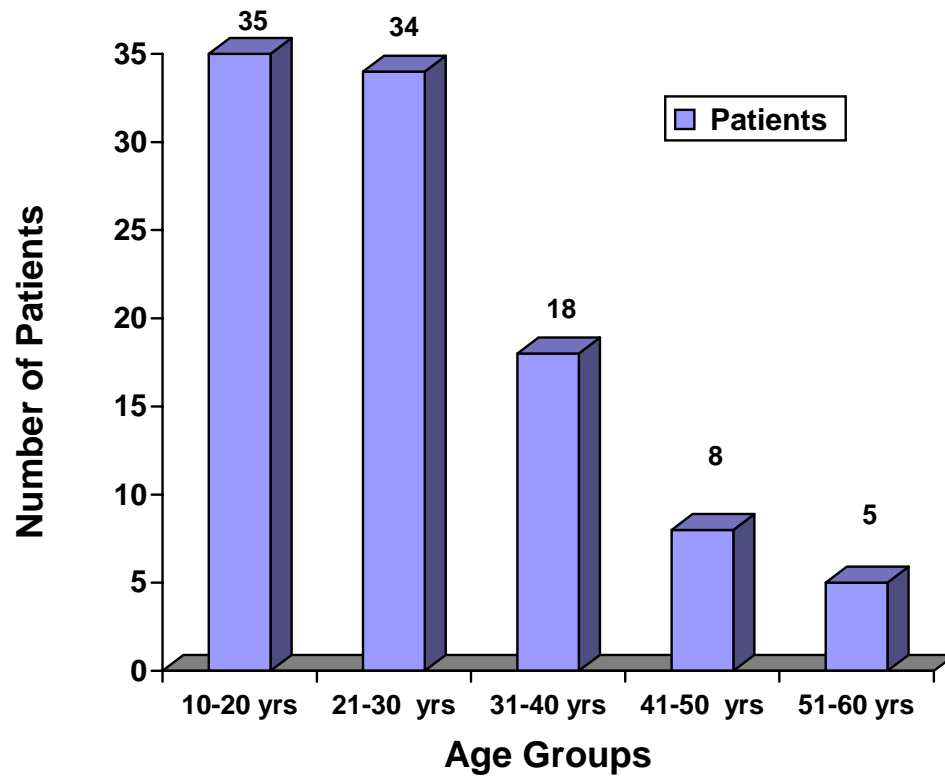
Post operative period

Complications

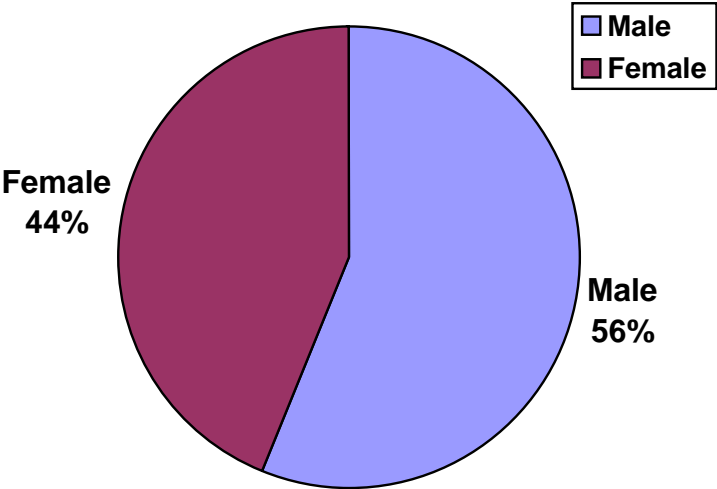
Follow up

Histopathological Examination Report.

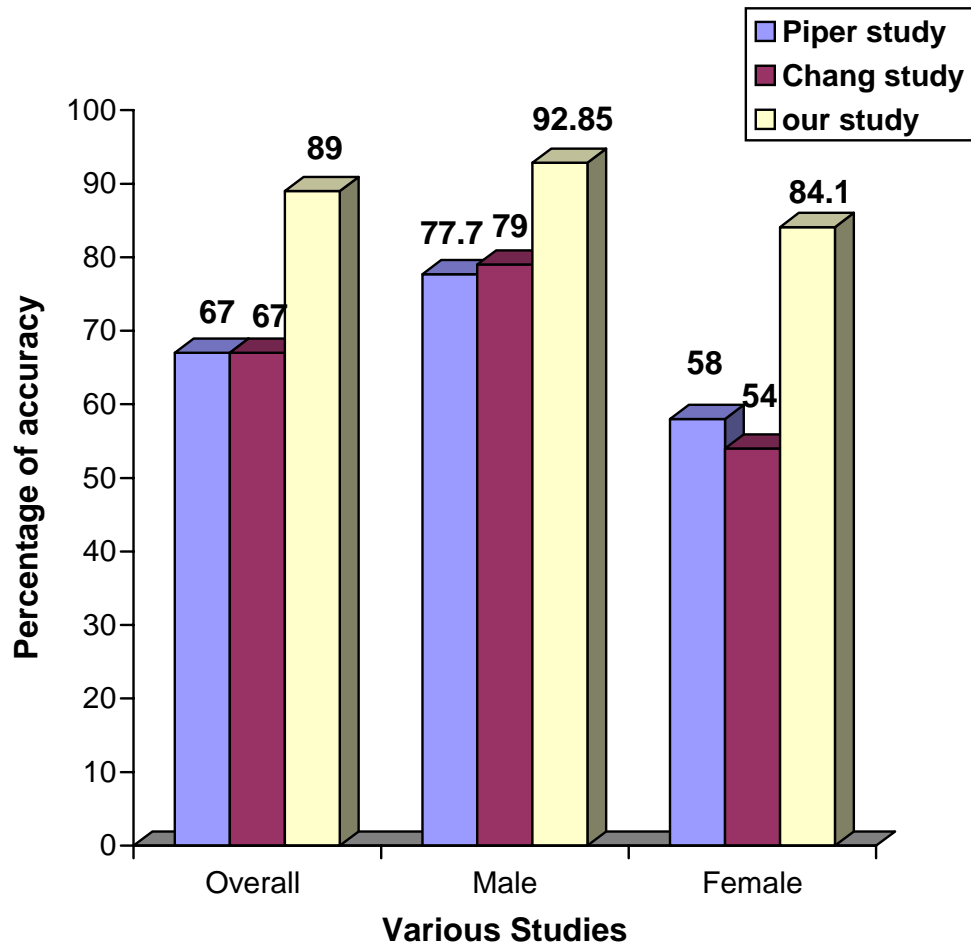
## Age Incidence



**Sex Incidence**



## Clinical Diagnostic Accuracy



## MASTER CHART

S.No	Name	Age / sex	IP.No.	Complaints	T°	Localized tenderness	Rebound tenderness	Guarding rigidity	Total WBC Count	HPE report
1.	Arulanandham	19 / M	849316	P.V.A	+	+	+	-	10,600	Inflammed appendix
2.	Manimegalai	27 / F	846855	P.N.A	+	+	+	+	12,480	Inflammed appendix
3.	Hemaladha	18 / F	832690	P.A	-	+	+	-	9,430	Normal appendix
4.	Mookambigai	15 / F	832645	P.N.F	+	+	+	-	8,890	Inflammed appendix
5.	Rajkumar	17 / M	846764	P	-	+	+	-	8,360	Inflammed appendix
6.	Mariammal	30 / F	841649	P	-	+	+	-	8,890	Inflammed appendix
7.	Ramesh Kumar	17 / M	849351	P.F.V	+	+	+	+	11,320	Inflammed appendix
8.	Vanathi	37 / M	848448	P	-	+	+	-	9,720	Inflammed appendix
9.	Kalamani	18 / M	880200	P.A	-	+	-	-	8,480	Inflammed appendix
10.	Shanmugapriya	17 / F	832706	P.N.V	-	+	-	-	8,320	Inflammed appendix
11.	Arunkumar	14 / M	832796	P.A.	+	+	+	-	7,340	Inflammed appendix
12.	Rajkumar	17 / M	835986	P.A	-	+	+	+	11,400	Inflammed appendix
13.	Sasikala	25 / F	845334	P.N.F	+	+	-	-	8,820	Inflammed appendix
14.	Priya	23 /F	852143	P	+	+	+	+	9,320	Inflammed appendix
15.	Manoranjitham	45 /F	856240	P.N.V	-	+	+	-	9,440	Inflammed appendix
16.	Janaki	34 /f	855391	P.F.	+	+	+	-	9,960	Inflammed appendix



S.No	Name	Age / sex	IP.No.	Complaints	T°	Localized tenderness	Rebind tenderness	Guarding raiding	Total Count	HPE report
17.	Madhusudhanam	40 /M	856279	P.N.V	-	+	-	-	10,280	Inflammed appendix
18.	Bhuvaneswari	25 / F	835605	P.N.A	-	+	-	-	7,830	Normal appendix
19.	Anbuselvi	22 / F	857036	P.F.A	+	+	-	-	6,820	Inflammed appendix
20.	Muniyan	38 / M	855374	P.F.C	+	+	+	+	10,400	Inflammed appendix
21.	Samuthran	42 / M	858589	P.F.N	+	+	+	+	11,680	Inflammed appendix
22.	Mani	14 / M	859436	P.N.V	-	+	-	-	9,460	Inflammed appendix
23.	Ponnusamy	51 / M	861916	P.F	+	+	+	+	13,400	Inflammed appendix
24.	Ponnammal	50 / F	860171	P	-	+	-	-	7,460	Inflammed appendix
25.	Mariyammal	32 /F	859766	P	-	+	-	-	10,200	Inflammed appendix
26.	Sathiya	18 /F	863299	P.N.A	-	+	+	-	8,640	Inflammed appendix
27.	Rani	19 / F	862137	P.F.N	+	+	-	-	7460	Inflammed appendix
28.	Nagarajan	17 / M	863339	9.N.V	-	=	-	-	10,320	Inflammed appendix
29.	Jayakarthisvarman	17 /M	863964	P	-	=	+	-	10,430	Inflammed appendix
30.	Rajakumar	27 / M	865402	P	-	=	-		4,840	Inflammed appendix
31.	Raguvarman	15 / M	865387	P.A	+	+	+	+	12,780	Caecal abscess vanishing appendix
32.	Rangasamy	22 / M	866148	P.V.A	-	+	+	-	8,472	Inflammed appendix

S.No	Name	Age / sex	IP.No.	Complaints	T°	Localized tenderness	Rebind tenderness	Guarding raiding	Total Count	HPE report
33.	Anbalagan	40 / M	866899	P.F	+	+	+	+	11,560	Inflammed appendix
34.	Dharmaraj	25 / M	867685	P.F.	+	+	+	+	12,840	Inflammed appendix
35.	Kavidha	25 / F	867644	P	+	+	-	-	7,820	Normal appendix
36.	Ganesh	49 / M	866146	P	-	+	-	-	6,200	Inflammed appendix
37.	Reka	20 / F	869180	P.A	-	+	+	-	5,400	Inflammed appendix
38.	Teamaraiselvi	16 / F	889188	P	-	+	-	-	10,940	Inflammed appendix
39.	Roomathi	16 / F	864639	P.F	+	+	+	-	8,320	Inflammed appendix
40.	Subramaniyan	38 / M	870824	A.P.V.C	-	+	+	-	10,980	Inpususception/normal appendix
41.	Rajalakshmi	19 / F	869988	P.F	+	+	+	-	13,480	Inflammed appendix
42.	Ponnusamy	24 / M	731600	P	-	+	+	-	10,400	Inflammed appendix
43.	Malathi	27 / M	875089	P.V.N.A	-	+	-	-	9,420	Normal appendix
44.	Mekala	19 / F	874178	P	-	+	+	-	10,840	Inflammed appendix
45.	Jayashree	24 / F	875111	P.A	-	+	+	-	8,920	Inflammed appendix
46.	Mallika	45 / F	876826	P.N	-	+	+	-	10,760	Inflammed appendix
47.	Chinnammal	50 / F	876891	P.V.F	+	+	+	-	9,800	Torsion ovarian cyst
48.	Bakiyalakshmi	55 / F	878662	P.A	+	+	+	+	11,340	Inflammed appendix

S.No	Name	Age / sex	IP.No.	Complaints	T°	Localized tenderness	Rebind tenderness	Guarding raiding	Total Count	HPE report
49.	Mariyappan	30 / M	878165	P	-	+	-	-	6,490	Inflammed appendix
50.	Ravi	46 / M	877734	P.C	+	+	+	-	11,820	Inflammed appendix
51.	Suganya	17 / F	879618	P.F.A	+	+	+	-	12,940	Inflammed appendix
52.	Kannan	52 / M	880296	P	+	+	-	-	10,420	Inflammed appendix
53.	Jayapal	26 / M	881190	P	-	+	+	-	9,780	Inflammed appendix
54.	Karthik	21 / M	881976	P	-	+	+	-	8,560	Inflammed appendix
55.	Prabu	23 / M	893711	P.A	-	+	+	-	7,860	Inflammed appendix
56.	Raja	21 / M	882823	P.R.V.A	-	+	+	-	6520	Inflammed appendix
57.	Amudhan	38 / M	882824	P.F.A	+	+	-	-	11,420	Inflammed appendix
58.	Kalaivani	18 / F	885071	P.N.A	+	+	-	-	9,370	Inflammed appendix
59.	Ilayaraja	22 / M	887253	P.	-	+	-	-	8,420	Inflammed appendix
60.	Jayarani	21 / F	886444	P.A	-	+	+	-	11,260	Inflammed appendix
61.	Kavitha	25 / F	887264	P.F.A	+	+	+	-	10,240	Inflammed appendix
62.	Neela	35 / F	887296	P	-	+	+	-	10,680	Inflammed appendix
63.	Thambusamy	56 /M	889334	P.N.A	+	+	+	+	12,890	Inflammed appendix
64.	Ramya	17 / F	888892	P	-	+	-	-	10,860	Inflammed appendix

S.No	Name	Age / sex	IP.No.	Complaints	T°	Localized tenderness	Rebind tenderness	Guarding raiding	Total Count	HPE report
65.	Sriranjani	14 / F	890017	P.A	-	+	-	-	9,640	Inflammed appendix
66.	Babu	17 / M	900039	P	-	+	-	-	9,640	Inflammed appendix
67.	Sahul hameed	39/M	901936	P.F.A	+	+	-	-	8,400	Inflammed appendix
68.	Vennila	19 / F	903143	P.F.A	+	+	+	+	11,840	Inflammed appendix
69.	Anandharaj	17 / M	901819	P	-	+	-	-	10,460	Inflammed appendix
70.	Malarvizhi	38 / F	902073	P.A	-	+	+	-	10,400	Inflammed appendix
71.	Janaki	21 / F	901925	P.V.F	+	+	+	-	11,400	Ovarian cyst Torsion
72.	Nagarajan	36 / M	906630	P	-	+	-	-	8,460	Inflammed appendix
73.	Arokiyadas	22 / M	906651	P	-	+	+	-	10,680	Inflammed appendix
74.	Chandra	19 / F	837516	P.A	-	+	+	-	9,420	Inflammed appendix
75.	Kumar	23 / M	844485	P.A.F	+	+	-	-	8,260	Inflammed appendix
76.	Nadhiselvam	35 / M	847691	P.A	-	+	-	-	11,570	Inflammed appendix
77.	Shadhik Basha	16 / M	458741	P.A	-	+	+	-	12,430	Inflammed appendix
78.	Rohini	25 / F	843294	P.N.V.A	-	+	-	-	11,320	Inflammed appendix
79.	Marudhapandi	15 / M	841653	P	-	+	+	-	10,890	Inflammed appendix
80.	Sundhar	30 / M	844494	P.F.A	+	+	+	+	11,460	Inflammed appendix

S.No	Name	Age / sex	IP.No.	Complaints	T°	Localized tenderness	Rebind tenderness	Guarding raiding	Total Count	HPE report
81.	Noorjahan	20 / F	858548	P.A	-	+	-	-	12,260	Inflammed appendix
82.	Muthumani	17 / M	863870	P	+	+	+	-	7,860	Inflammed appendix
83.	Selvi	27 / F	868570	P	-	+	+	-	6,720	Inflammed appendix
84.	Gurumoorthi	30 / M	868413	P.A	-	+	+	-	10,860	Inflammed appendix
85.	Rajesh	46 / M	65759	P	-	+	-	-	9,820	Inflammed appendix
86.	Sarabesan	23 / M	871674	P.N.V	-	+	+	-	11,480	Inflammed appendix
87.	Murugan	38 / M	677572	P.A	-	+	-	-	8,890	Normal appendix
88.	Akila	18 / F	871667	P.A	-	+	-	-	6,840	Inflammed appendix
89.	Banumadhi	27 / F	873831	P.F.A	+	+	+	+	11,460	Inflammed appendix
90.	Karthikayan	30 / M	876821	P.A.N	-	+	+	-	12,260	Inflammed appendix
91.	Jayandhan	35 / M	592590	P	-	+	-	-	10,780	Inflammed appendix
92.	Suba	35 / F	879501	P	-	+	-	-	9,760	Normal appendix
93.	Manivel	38 / M	901292	P.V.C	-	+	+	-	9,460	Ileocaecal TB
94.	Gandhi	36 / M	891986	P.A	-	+	+	-	11,370	Inflammed appendix
95.	Mani	30 / M	101085	P.F.A	+	+	+	+	12,310	Inflammed appendix

S.No	Name	Age / sex	IP.No.	Complaints	T°	Localized tenderness	Rebind tenderness	Guarding raiding	Total Count	HPE report
96.	Sathiya	16 / F	883701	P.A	-	+	-	-	10,420	Inflammed appendix
97.	Senthilkumar	24 / M	932830	P.A.N	-	+	+	-	9,480	Inflammed appendix
98.	Kasthuri	25 / F	950601	P.F	+	+	+	+	11,740	Inflammed appendix
99.	Sivaprakasam	16 / M	882828	P.A	+	+	-	-	9,240	Inflammed appendix
100.	Kaliyaperumal	40 / M	882900	P.A	-	+	-	-	8,640	Inflammed appendix

For the presenting symptoms the abbreviation used -

PAIN ABDOMEN	:	P
FEVER	:	F
ANOREXIA	:	A
VOMITING	:	V
NAUSEA	:	N